Math 357
Long quiz 02B

2024–02–19 (M)

Your name: _____

(a) Let $\mathbf{Z}$ denote the ring of integers, and consider the polynomial ring $\mathbf{Z}[t_1, t_2]$. For each of the following polynomials, state its (total) degree and its number of (nonzero) homogeneous components.

$$f = t_1^4 + t_1^2 t_2^2 - t_1 t_2 + t_2^2$$
$$g = t_1^6 + (t_1 + t_2)^6 + (t_1^2 - t_2^2)^3$$

Hint: Think before you compute.

(b) Let $\mathbf{F}_3 = \mathbf{Z}/(3)$ denote the finite field with three elements. View the polynomial g above in the polynomial ring $\mathbf{F}_3[t_1, t_2]$. State its (total) degree and its number of (nonzero) homogeneous components. *Hint:* Think before you compute.